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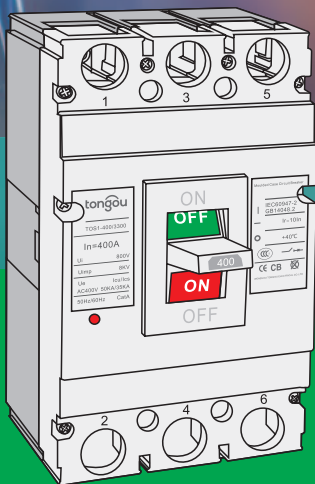
tongou | Electric Artisan
Since 1993

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Industrial Control & Power Distribution

Contactor, MCCB, Intelligent circuit breaker

Circuit Protection

- > MCB, RCCB, RCBO, Switch-disconnector

PV EV New Energy

- > Type B RCCB, DC MCB, Modular contactor
- > DC Surge arrester, DC Fuse Holder

Industrial Control & Power Distribution

- > Contactor, MCCB,
- > LV power Intelligent circuit breaker

tongou
ELECTRICAL SINCE 1993



Green & Safe

Electric artisan in the industry



Certification & Warranty

Tongou electrical manufactured products is fully tested, approved and certified by national and international third parties from BV(Bureau Veritas), TUV, Intertek, COC, SAA, SGS Laboratory organization, Won approvals of CE, SEMKO, CB, CCC, RoHS and ISO9001, ISO14001, OHSAS18001 Quality System Certificates.

Warranty:
Tongou electrical manufactured products with 3-5 years warranty and Lifetime after-sale maintenance.



To stay true to our mission, insisting on producing superior quality products to keep electricity safety in the industry:

Over 25 years

Tongou electrical was established in 1993, focus on manufacturing electric products for over 25 years, which has been dedicated effort to protecting personal body safety, circuit safety and electrical equipment safety.

Over 4000 square

With an area of more than 4,000 square meters, tongou electrical has more than 100 employees produce the reliable products, we believe that great people and partners make Tongou will be a great company.

Automation

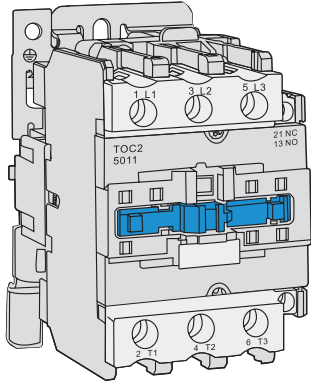
More automation equipment and manipulator be involved in production, to provide more efficient, more stable products.

'You can tell it's a high quality product when you hold it in your hands'

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TOC2 AC Contactor



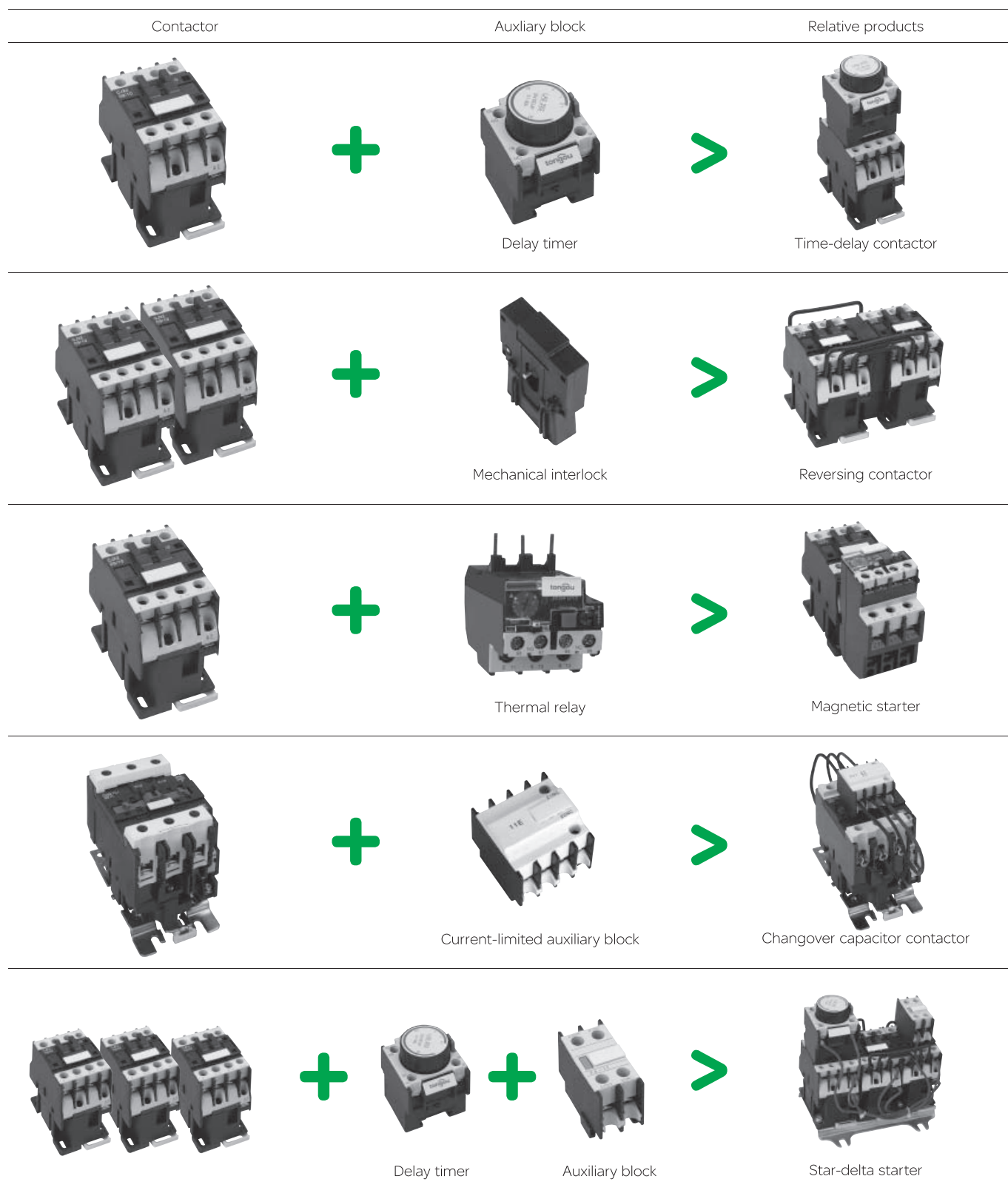
IEC 60947-4-1

- Adopt building block system to mount auxiliary contactor block, air delay auxiliary contactor, thermal overload relay and so on, which can be combined into multiple derived series product.
- Contactor has the advantage of Small volume, light, low consumption, high life, good safety.
- Main contactor below 32A has 1 N/C or 1 N/O, there is 1 N/C and 1 N/O above 40A. Contactor can be assembled with TOWDA, TOWDT auxiliary contact or Time-delay block.
- Contactor can not only use screw mounting, but also use 35mm [TOC2-D09-32], 75mm [TOC2-D40-95] international standard Din-rail mounting.

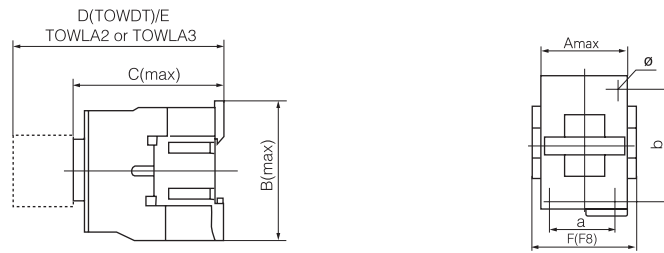
Main Technical Parameter

Parameter Item	Type	TOC2	TOC2	TOC2	TOC2	TOC2	TOC2	TOC2	TOC2	TOC2	TOC2	
		-D09	-D12	-D18	-D25	-D32	-D40	-D50	-D65	-D80	-D95	
Rated working current (A)	380V	AC-3	9	12	18	25	32	40	50	65	80	95
		AC-4	3.5	5	7.7	8.5	12	18.5	24	28	37	44
	660V	AC-3	7	9	12	18	21	34	39	42	49	49
		AC-4	1.5	2	3.8	4.4	7.5	9	12	14	17.3	21.3
Rated heat current (A)		20	20	32	40	50	60	80	80	110	110	
Rated voltage (A)		690	690	690	690	690	690	690	690	690	690	
Standard power ratings of 3-phase motors 50/60Hz inn category AC-3 (kW)	220V	2.2	3	4	5.5	7.5	11	15	18.5	22	25	
	380V	4	5.5	7.5	11	15	18.5	22	30	37	45	
	660V	5.5	7.5	10	15	18.5	30	33	37	45	55	
Operating frequency (sub/h)	Electrical life	AC-3	1200	1200	1200	1200	600	600	600	600	600	600
		AC-4	300	300	300	150	150	150	150	150	150	150
	Mechanical life	3600	3600	3600	3600	3600	3600	3600	3600	3600	2400	2400
Electrical life (x104)	AC-3	100	100	100	100	80	80	60	60	60	60	
	AC-4	20	20	20	20	20	15	15	15	10	10	
Mechanical life(x104)		1000	1000	1000	1000	800	800	800	800	600	600	
Average power consumption (VA) (20°C)	50Hz	Pick-up	76	76	76	110	110	230	230	230	230	230
		Holding	9.4	9.4	9.4	11	11	32	32	32	32	32
Per weight(Kg)	3P+NO/NC	0.33	0.33	0.35	0.52	0.55	1.22	1.22	1.22	1.42	1.42	
	4P 4NO	0.33	0.33	-	0.52	-	1.32	1.32	1.32	1.59	1.59	
	4P 2NO 2NC	0.33	0.33	-	0.52	-	1.37	1.37	1.37	1.65	1.65	

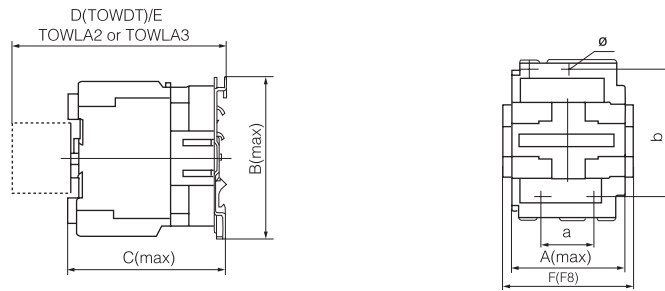
Contactor and auxiliary block



Outline and Mounting Dimension



TOC2-D09-32



TOC2-D40-95

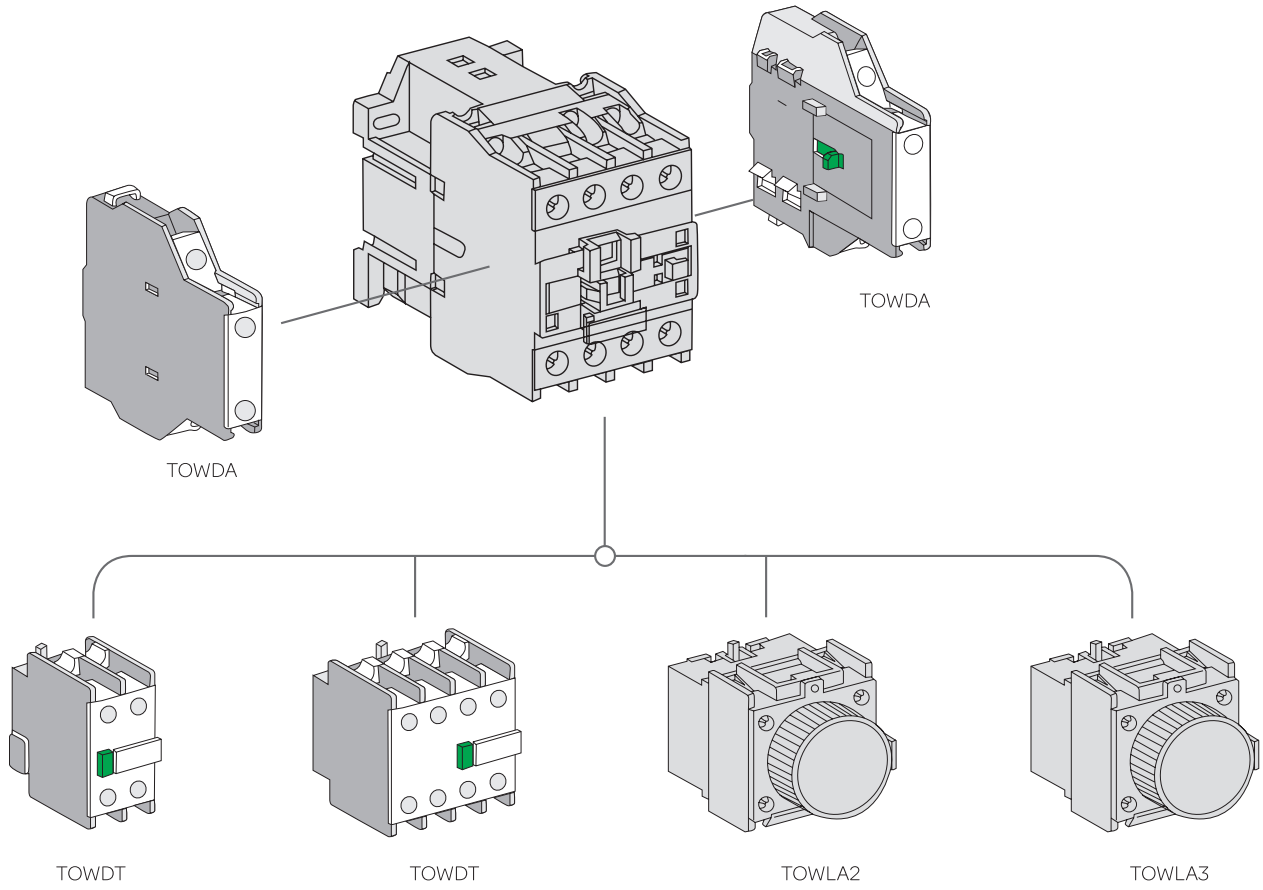
Unit:mm

Type	Amax	Bmax	Cmax	Dmax	Emax	Fmax	a	b	ø
TOC2-D09-12	47	76	82	115	135	73	35	50/60	4.5
TOC2-D18	47	76	87	120	140	73	35	50/60	4.5
TOC2-D25	57	86	95	128	149	83	40	50/60	4.5
TOC2-D32	57	86	100	133	154	83	40	50/60	4.5
TOC2-D4011-6511	77	129	116	147	167	103	40	100/110	6.5
TOC2-D40004-65004	85	129	115	150	168	113	40	100/110	6.5
TOC2-D40008-65008	85	129	126	150	168	111	40	100/110	6.5
TOC2-D8011-9511	87	129	127	155	175	113	40	100/110	6.5
TOC2-D80004-95004	97	129	123	155	175	123	40	100/110	6.5
TOC2-D80008-95008	97	129	134	155	175	123	40	100/110	6.5

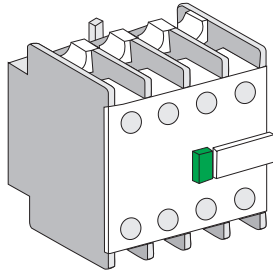
Note: a. f: min.distance needed to mound and dismount the coil

b. X1:Confirm flashover distance according to working volt and breaking capacity

Auxiliary Contact Block



TOWDT, TOWDA Auxiliary Contact Block



Application range

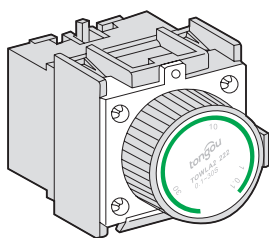
TOWDT auxiliary contact block can be mainly used in the controllable circuit of AC 50Hz, AC-15, rated operational voltage 380V and rated current up to 0.95A, or in DC-13, rated operational voltage DC220V and rated current up to 0.15A. It can be used to control signal and Electrical linkage. This product is suitable for the conditions when TOC2 series contactor has no enough auxiliary contact in controllable Circuit, combining auxiliary contact block with TOC2 series contactor can increase number of auxiliary contacts. It has two styles, one is two contact block, another is four contact block, The this product conforms to GB14048.4, IEC60947-4-1 standard.

Use of auxiliary contact group

Type	Structure		Number of contacts	Installable max number of auxiliary contact block		Weight (kg)
	1	2		Front mount	Lateral mount	
TOWDT-11	1	1	2	1 pcs TOC2-D09-95	-	0.036
TOWDT-20	2	0	2			0.036
TOWDT-02	0	2	2			0.036
TOWDT-22	2	2	4			0.061
TOWDT-13	1	3	4			0.061
TOWDT-40	4	0	4			0.061
TOWDT-04	0	4	4			0.061
TOWDT-31	3	1	4			0.061
TOWDA-11	1	1	2			-
TOWDA-20	2	0	2	-	TOC2-D09-95	0.048

Technical parameter

Parameter	Type	TOWDT	TOWDA
Rated insulation voltage(V)		690	690
Appointed heating current(A)		10	10
Rated control capacity		AC-15 360 VA; DC-13 33(W)	
Rating working current		AC-15 380 V 0.95A; DC-13 220V 0.15A	
Maximum operating frequency		3600	3600
Mechanical life($\times 10^4$)		1000	1000
Electrical life($\times 10^4$)		100	100



Application range

TOWLA Time delay block is mainly used in the controllable circuit of AC 50Hz/60Hz, AC-15, rated operational voltage AC380V and rated current up to 0.95A, or DC-13, rated operational voltage DC220V and rated current up to 0.15A. It is used as timing control.

This product can be assembled with TOC2 series AC contactor, so that it will have time-delay effects. And it has two styles, one is electricity delay and another one is power outages delay.

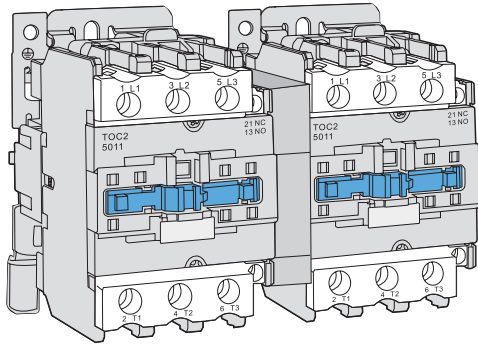
This product conforms to GB14048.4 IEC60947-4-1 standard.

Instructions for the use of air delay head

Type	Time-delay type	Range	Number of contacts	Installable max number of auxiliary contact block	Weight (kg)
TOWLA2-220	Electricity delay	0.1~3S	1 NO+1NC	1 pcs (TOC2-D09~170)	0.087
TOWLA2-222	Electricity delay	0.1~30S			0.087
TOWLA2-224	Electricity delay	10~180S			0.087
TOWLA3-320	Electricity delay	0.1~3S			0.087
TOWLA3-322	Electricity delay	0.1~30S			0.087
TOWLA3-324	Electricity delay	10~180S			0.087

Technical parameter

	TOWLA2	TOWLA3
Rated insulation voltage(V)	690	690
Appointed heating current(A)	10	10
Rated control capacity	AC-15 360 VA; DC-13 33(W)	
Rating working current	AC-15 380 V 0.95A; DC-13 220V 0.15A	
Maximum operating frequency	3600	3600
Mechanical life (x10 ⁴)	1000	1000
Electrical life (x10 ⁴)	100	100



Application range

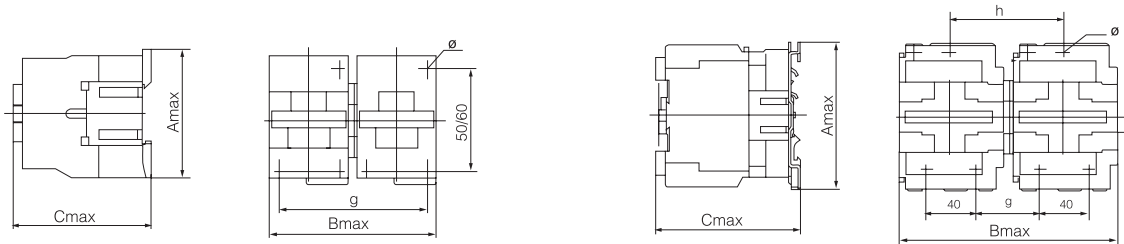
TOC2I series reversible contactor is suitable for using in the circuits of AC 50Hz or 60Hz, the rated insulation voltage 690V, rated current up to 800A, convertible controlling the motor, it can avoid short circuit when reversing. Combined with the thermal overload relay, it can protect overload circuit.

This product conforms to GB 14048.4 IEC60947-4-1 standard.

Main Parameter And Technical Characteristic

Parameter Item	Type	TOC2I										
		-D09	-D12	-D18	-D25	-D32	-D40	-D50	-D65	-D80	-D95	
Rated working current (A)	380V AC-3	9	12	18	25	32	40	50	65	80	95	
Standard power ratings of 3-phase motors 50/60Hz in category AC-3 (kW)	220V	2.2	3	4	5.5	7.5	11	15	18.5	22	25	
	380V	4	5.5	7.5	11	15	18.5	22	30	37	45	
	660V	5.5	7.5	10	15	18.5	30	33	37	45	55	
Per weight (Kg)		0.72	0.72	0.72	1.11	1.18	2.49	2.52	2.55	2.96	2.97	

Outline and Mounting Dimension



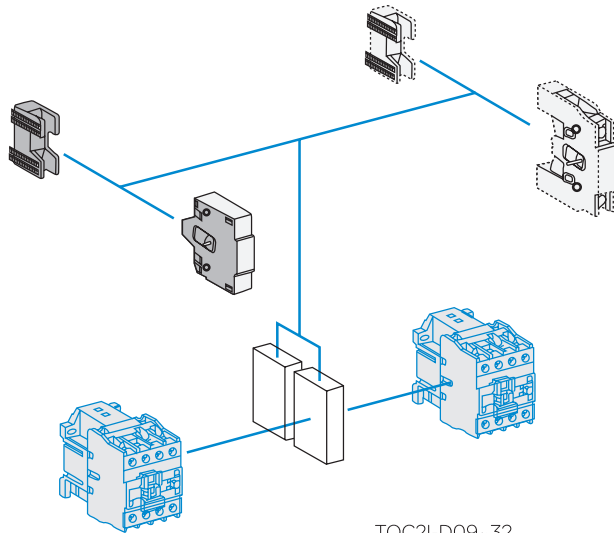
TOC2I-D0 9-32

TOC2I-40N-95N

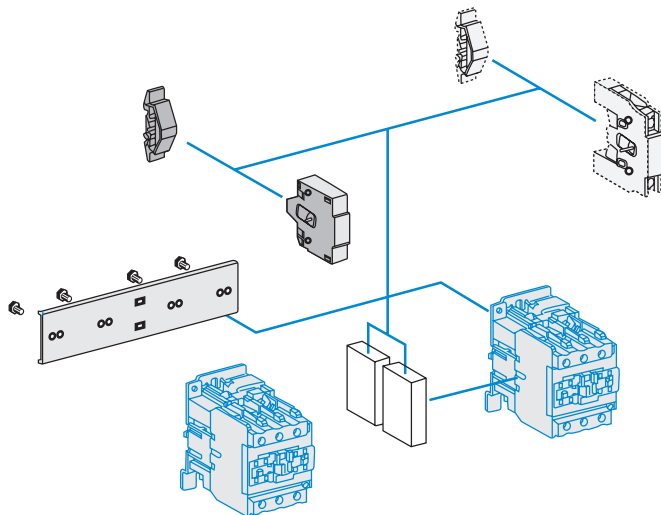
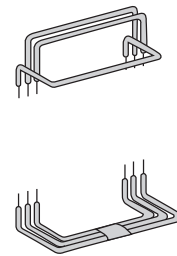
Type	Amax	Bmax	Cmax	g	h	Ø
TOC2I-D09-12	81	106	85	95	-	4.5
TOC2I-D18	81	106	87	95	-	4.5
TOC2I-D25	94	129	100	112	-	4.5
TOC2I-D32	96	129	103	112	-	4.5
TOC2I-D40-65	129	165	116	50	90	6.5
TOC2I-D80-95	129	185	127	57	96	6.5

Schema Of Interlock Parts Mounting

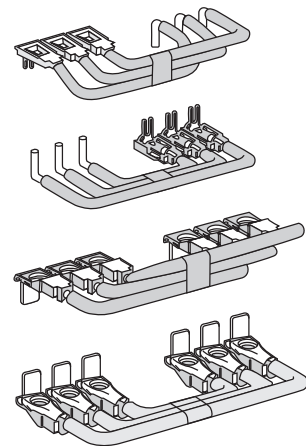
Contactor	Mechanical interlock		Power connection parts
Installation of reversing device need two same contactors	Without electrical interlock	With electrical interlock (2 N/C contacts)	Reversible contactor



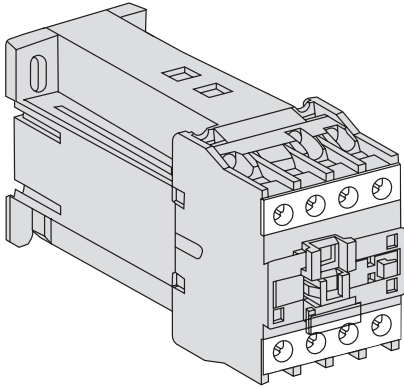
TOC2I-D09-32



TOC2I-40-95



TOC2D DC Operated AC contactor



Application range

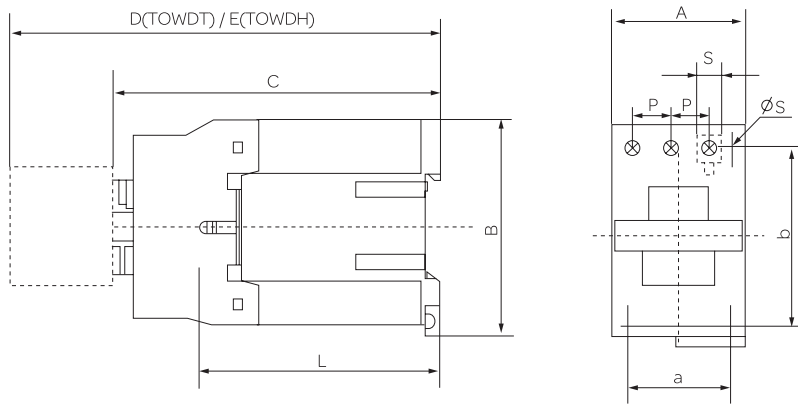
TOC2D series DC operated AC contactor (hereinafter to be referred as contactor), it mainly applies to the circuit of AC 50Hz/60Hz, and rated insulation voltage 690V. When used in AC-3, and rated operational voltage 380V, rated current up to 95A, for long distance breaking circuit block, time-delay block, thermal overload relay devices etc.

This product conforms to GB14048.4 IEC60947-4-1. standard.

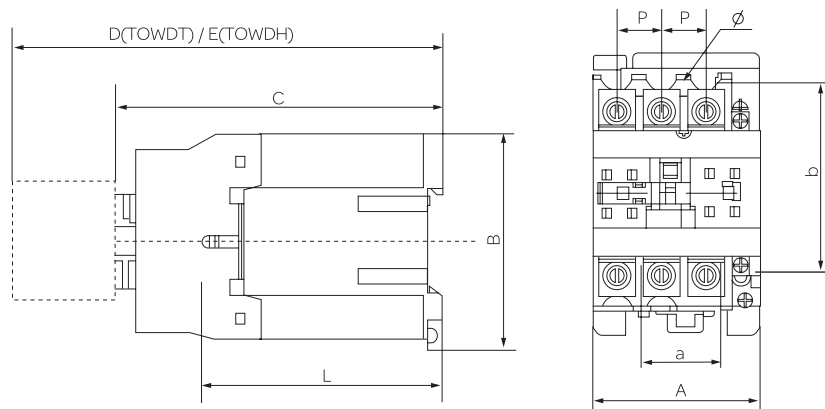
Main Parameter And Technical Characteristic

			TOC2D -D09	TOC2D -D12	TOC2D -D18	TOC2D -D25	TOC2D -D32	TOC2D -D40	TOC2D -D50	TOC2D -D65	TOC2D -D80	TOC2D -D95	
Rated operational current (A)	380V	AC-3	9	12	18	25	32	40	50	65	80	95	
		AC-4	3.5	5	7.7	8.5	12	18.5	24	28	37	44	
	660V	AC-3	7	9	12	18	21	34	39	42	49	49	
		AC-4	1.5	2	3.8	4.4	7.5	9	12	14	17.3	21.3	
Conventional heating current (A)			20	20	32	40	50	60	80	80	110	110	
Rated insulation voltage (V)			690	690	690	690	690	690	690	690	690	690	
Power of controllible 3-phase squirrel-cage motor (kW) AC-3	220V		2.2	3	4	5.5	7.5	11	15	18.5	22	25	
	380V		4	5.5	7.5	11	15	18.5	22	30	37	45	
	660V		5.5	7.5	10	15	18.5	30	33	37	45	55	
Operational frequency (operation/h)	Electric life (×10 ⁴)	AC-3	1200	1200	1200	1200	600	600	600	600	600	600	
		AC-4	300	300	300	150	150	150	150	150	150	150	
	Mechanical life(×10 ⁴)			3600	3600	3600	3600	3600	3600	3600	3600	2400	2400
Electric life (operation/h)	AC-3		100	100	100	100	80	80	60	60	60	60	
	AC-4		20	20	20	20	20	15	15	15	10	10	
Mechanical life (operation/h)			1000	1000	1000	1000	800	800	800	800	600	600	
Cable connection	Flexible cable without terminal	One cable	1/4	1/4	1.5/6	1.5/10	2.5/10	2.5/25	2.5/25	2.5/25	4/50	4/50	
		Two cables	1/4	1/4	1.5/6	1.5/6	2.5/10	2.5/16	2.5/16	2.5/16	4/25	4/25	
	Flexible cable with terminal	One cable	1/4	1/4	1/6	1/6	1/10	2.5/25	2.5/25	2.5/25	4/50	4/50	
		Two cables	1/2.5	1/2.5	1/4	1/4	1.5/6	2.5/10	2.5/10	2.5/10	4/16	4/16	
	Inflexible cable without terminal	One cable	1/4	1.5/6	1.5/6	1.5/6	1.5/10	2.5/25	2.5/25	2.5/25	4/50	4/50	
		Two cables	1/4	1.5/6	1.5/6	1.5/6	2.5/10	2.5/16	2.5/16	2.5/16	4/25	4/25	
	Screw size			M3.5	M3.5	M3.5	M4	M4	M8	M8	M8	M10	M10
	Tightening torque (N·m)			0.8	0.8	0.8	1.2	1.2	3.5	3.5	3.5	4	4
DC coil power (W)			9	9	11	11	11	20	20	20	20	20	
Operating range			Pick-up voltage : 85%~110% Us ; Drop-out voltage : 10%~70% Us										
Basic parameter of auxiliary contact			AC-15: 360VA DC-13: 33W lth: 10A										
Unit weight (kg)	3P+NO/NC		0.58	0.58	0.6	0.83	0.85	2.2	2.2	2.2	2.4	2.4	
	4P (4N/O)		0.58	0.58	-	0.83	-	2.3	2.3	2.3	2.57	2.57	
	4P (2N/O+2N/C)		0.58	0.58	-	0.83	-	2.35	2.35	2.35	2.63	2.63	

Outline and Mounting Dimension



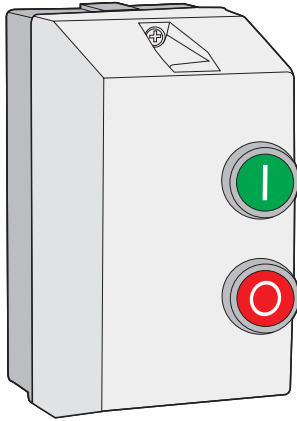
TOC2D-09-12



TOC2D-40-95

TOC2D-09-12	Amax	Bmax	Cmax	Dmax	Emax	a	b	Ø	L	P	S
TOC2D-18	47	76	82(116)	120.5(154.5)	140.5(174.5)	34/35	50/60	4.5	60(95)	105	8.6
TOC2D-25	47	76	87(122)	125.5(160.5)	145.5(180.5)	34/35	50/60	4.5	61(96)	11.3	10.4
TOC2D-32	57	86	95(131)	133.5(169.5)	153.5(189.5)	40	48	4.5	70(107)	13.2	11.7
TOC2D-4011-6511	57	86	100(138)	138.5(176.5)	158.5(196.5)	40	48	4.5	71.6(120)	14.5	13
TOC2D-4004/4008-6504/6508	77	129	116(173)	154.5(211.5)	174.5(231.5)	40	100/110	6.5	78(135)	20	8.6
TOC2D-8011-9511	84	129	116(173)	154.5(211.5)	174.5(231.5)	40	100/110	6.5	78(135)	20	8.6

TOQ1 Magnetic starter



Application range

TOQ1 series magnetic starter mainly be applicable to the AC circuits of 50Hz/60Hz under rated voltage up to 380V and rated current up to 95A. It is used for controlling the .3-phase squirrel-case type induction motor to operate starting, stop, forward or reverse. And it can protect the motor from overload and interruption.

Characteristics

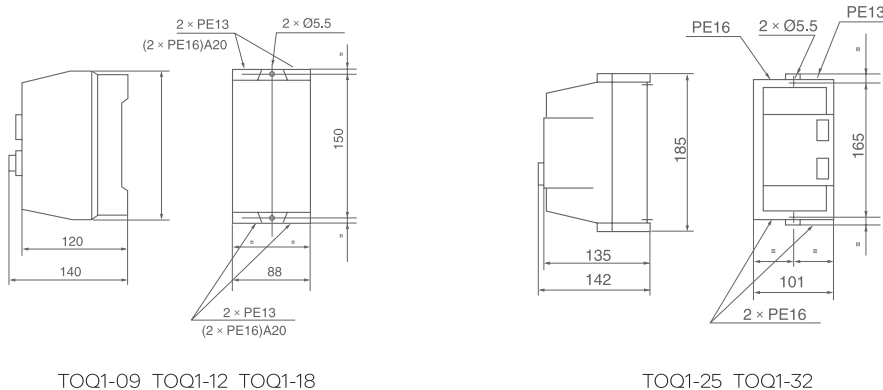
Protection Grade: IP54, water-proof, dust-proof.

Can be equipped with indicator light (if need)

Technical Parameters

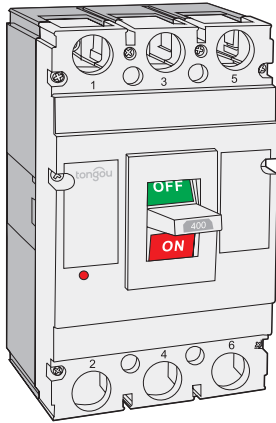
Type	Selected AC Contactor	Thermal Relay	Setting Range	Rated Power (AC-3)			
				200-240V		380-440V	
				kW	HP	kW	HP
TOQ1-09	TOC2-D09	TOL28-13	0.1-0.16A	0.02	1/38	0.06	1/13
		TOL28-13	0.16-0.25A	0.03	1/25	0.09	1/9
		TOL28-13	0.25-0.4A	0.06	1/13	0.12	1/6
		TOL28-13	0.4-0.63A	0.09	1/9	0.25	1/3
		TOL28-13	0.63-1A	0.18	1/4	0.37	1/2
		TOL28-13	1-1.6A	0.25	1/3	0.55	3/4
		TOL28-13	1.25-2A	0.37	1/2	0.55	3/4
		TOL28-13	1.6-2.5A	0.55	3/4	0.75	1
		TOL28-13	2.5-4A	0.75	1	1.1	1.5
		TOL28-13	4-6A	1.1	1.5	2.2	3
		TOL28-13	5.5-8A	1.5	2	3	4
TOL28-13	7-10A	2.2	3	4	5.5		
TOQ1-12	TOC2-D12	TOL28-13	9-13A	3	4	4	5.5
TOQ1-18	TOC2-D18	TOL28-13	12-18A	4	5.5	5.5	7.5
TOQ1-25	TOC2-D25	TOL28-13	17-25A	5.5	7.5	7.5	10
TOQ1-32	TOC2-D32	TOL28-13	23-32A	7.5	10	11	25
		TOL28-23	28-36A	7.5	10	15	20

Outline and Mounting Dimension





TOS1 Series Moulded Case Circuit Breaker



IEC 60947-2
EN 60947-2

Outline and Mounting Dimension

TOS1 series moulded case circuit breaker is one of products developed and manufactured by adopting international advanced technology. It is supplied with rated insulating voltage 550 and 800V and used for circuit of AC 50/60Hz, rated operating voltage AC 400V (or below), rated operating current up to 1600A for infrequent changing over and starting of the motors. The products conform to IEC60947-2 standard.

Main Technical Specification

Table 1

Type	Rated current (A)	Pole	Rated insulating voltage (V)	Rated operating voltage (V)	Arcing-over distance (mm)	Ultimate short circuit breaking capacity (kA)	Services short circuit breaking capacity (kA)	Operation performance		Utilization category
								Load	Unload	
TOS1-63	(6),10,16,20,25,32,40,50,63	3, 4	500V	400V	0	50	35	1500	8500	A
TOS1-125	(10),16,20,25,32,40,50,63,80,100,125				$0(\leq 50)$	50	35			
TOS1-250	100, 125, 160, 180, 200, 225, 250				≤ 50	50	35	1000	7000	
TOS1-400	315, 350, 400				≤ 100	65	42	1000	4000	
TOS1-630	400, 500, 630				≤ 100	100	65			
TOS1-800	630, 700, 800	3	800V	400V	≤ 100	100	65			
TOS1-1250	1000, 1250				≤ 100	125	75			
TOS1-1600	1600				≤ 100	150	80			

Note: 6A without thermal protection

The N-pole of four-poles breaker is sited at the right side of the product has four types:

Type A: Without current trip-lease on N pole which making all the time, not closing and opening with the other three poles.

Type B: Without current trip-release on N pole which closing and opening with the other poles.

Type C: With current trip-release which closing and opening with the other three poles.

Type D: With current trip-release which making all the time not closing and opening with the other three poles.

Protection Characteristic

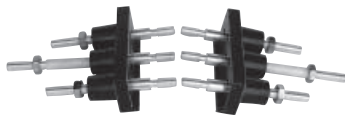
The thermodynamic release of a circuit breaker provides the feature of inverse time-delay, while the magnetic release is the instantaneous operation as shown on table 2(distribution circuit breaker) and table 3 (motor protection circuit breaker).

Table 2

Rated current of release (A)	Thermodynamic release(ambient temperature land +40°C marine +45°C)		Operating current of magnetic release (A)
	1.05In(cold state) Inoperative time(h)	1.30In(heat state) Operative time(h)	
10 ≤ In ≤ 63	≥1	< 1	10In120%
63 < In ≤ 100	≥2	< 2	
100 < In ≤ 800	≥2	< 2	5In120% 10In120%

Table 3

Rated current of release (A)	Thermodynamic release (ambient temperature land +40°C marine +45°C)				Operating current of magnetic release (A)
	1.0In(cold state) non-trip time(h)	1.20In(heat state) trip time (h)	1.50In(heat state) trip time (h)	7.2In(cold state) trip time(h)	
10 ≤ In ≤ 225	≥2	< 2	≤ 4min	4s < Tp ≤ 10s	12In120%
225 < In ≤ 630			≤ 8min	6s < Tp ≤ 20s	



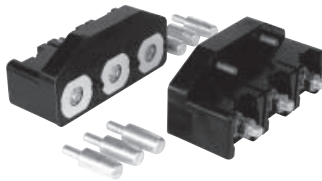
Back panel connection

Accessories of Circuit Breaker

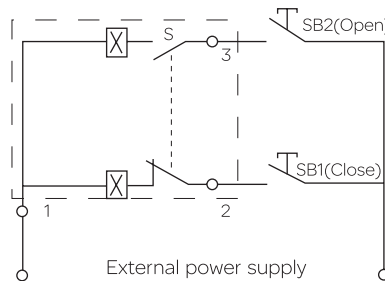
The external accessories of the breaker

Motor-driven operation device

1) Wiring diagram of type CDM electromagnetic operation device(fitting TOS1-63,125,250) see the following drawing (wiring diagram of the external accessories of the breaker in the dotted frame)



Plug-in



Electromagnetic operation device

Code description: SB1, SB2 stand for push button.(provided by users themselves)

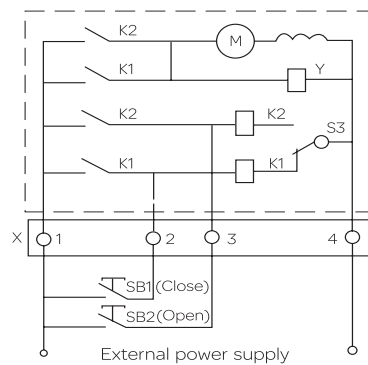
Number "1", "2", "3" stand for number of wiring terminals.

Voltage rating: AC50/60Hz 230V 400V, DC 220V

2) Wiring diagram of type CD motor-driven operation device (fitting TOS1-400, 630, 800) see belows (wiring diagram of the external accessories of the breaker in the dotted frame)



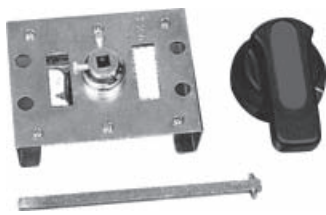
Motor-driven operation device



Code description: SB, SB₂ stand for push button. (provided by users themselves)

"X" stands for line connection terminals

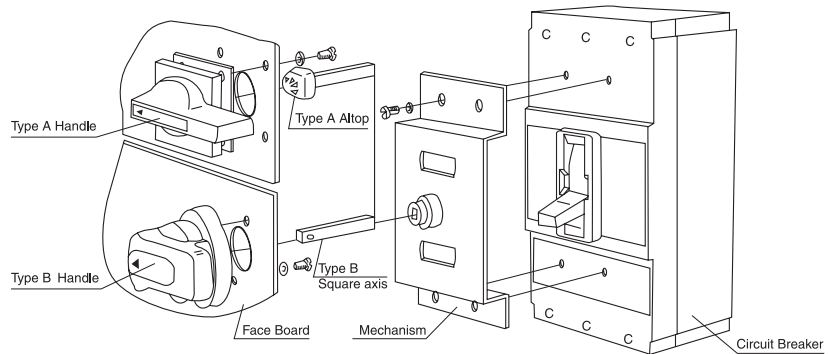
Voltage rating: AC50/60Hz 230V, 400V, DC220V



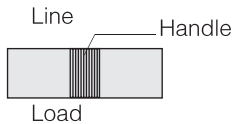
Rotary handle operation device

Rotary handle operation device

The mechanism is used in moulded case circuit breaker to operate the draw-out panel. Power distribution panel and supply box outside the panel by turning the handle ,and to ensure the door of panel would not be opened when the breaker being on.
The hand-drive mechanism can be equipped with two types of operation, one is "A" model square handle , the other is "B" model round handle.



Release pattern and accessories code



SHT: Shunt release; UVR: Under-voltage release;
AX: Auxiliary contact; AL: Alarm contact

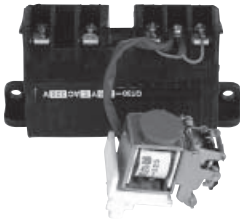
Release pattern and accessories code	Name	Type	TOS1-63, 125, 250	TOS1-400	TOS1-630	TOS1-800
200, 300	Without accessories		200: magnetic release (only short circuit protection) 300: thermal magnetic release(both overload and short circuit protection)			
208, 308	Alarm contact		AL	AL	AL	AL
210, 310	Shunt release		SHT	SHT	SHT	SHT
220, 320	Auxiliary contact		AX	AX	AX	AX
230, 330	Under-voltage release		UVR	UVR	UVR	UVR
240, 340	Shunt release Auxiliary contact		SHT AX	SHT AX	SHT AX	AX SHT
250, 350	Shunt release Under-voltage release		SHT UVR	SHT UVR	SHT UVR	UVR SHT
260, 360	Two group of auxiliary contact		AX AX	AX AX	AX AX	AX AX
270,370	Under-voltage release Auxiliary contact		AX UVR	AX UVR	AX UVR	UVR AX
218, 318	Shunt release Alarm contact		AL SHT	SHT AL	AL SHT	AL SHT
228, 328	Alarm contact Auxiliary contact		AL AX	AL AX	AL AX	AL AX
238, 338	Under-voltage release Alarm contact		AL UVR	AL UVR	AL UVR	AL UVR
248, 348	Shunt release, Alarm contact, Auxiliary contact		AL AX SHT	SHT AL AX	AL AX SHT	AL AX SHT
268, 368	Two group of auxiliary contact Alarm contact		AL AX AX	AL AX AX	AL AX AX	AL AX AX
278, 378	Shunt release, Alarm contact, Under-voltage release		AL AX UVR	AL AX UVR	AL AX UVR	AL UVR AX

According to user's demands, accessories could lead to direct wire outcoming or line wiring terminals could be added(please mark out in case of making order).

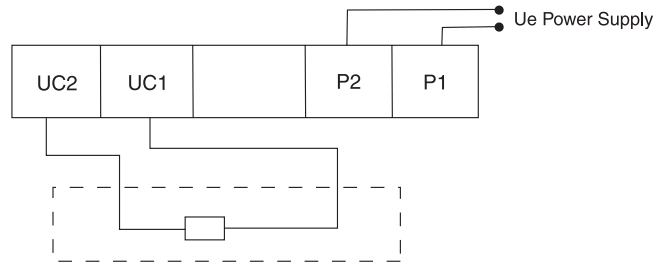
Under-voltage release

Wiring diagram of the under-voltage module connected externally (the internal accessories in the dotted frame)

Ue: AC50/60Hz 230V, 400V



Under-voltage release

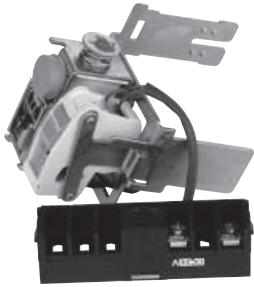


When the operation voltage is 35%-70% of the rated voltage, the under-voltage release should make the breaker trip correctly.

When the operation voltage is 85%-110% of the rated voltage, the under-voltage release should make the breaker close.

In case of the operation voltage less than 35% of the rated voltage, the under-voltage should prevent the breaker from closing.

Note: Only the under-voltage release should be energized in advanced, the breaker could be recramped and turned-on, otherwise the breaker will be damaged.

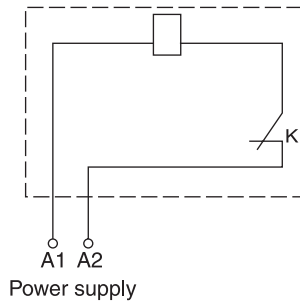


Shunt release

Shunt release

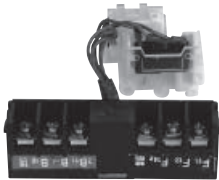
Scheme of wiring(the internal accessories in the dotted frame)

"K" is the slow motion switch normal-close contact connect the coil in series in the shunt release. It turns-on or turns-off voluntarily as soon as the breaker on or off.



Voltage rating: AC50/60Hz 230V 400V, DC 110V 220V

The shunt release should make the breaker trip reliably when the operation voltage is 70%-110% of the rated control voltage.



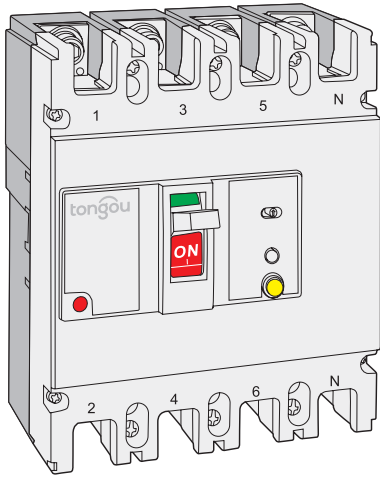
Alarm contact

Alarm contact

The position of the breaker in "off" or "on"	
The position of the breaker in "free trip" (alarm)	



TOS1L Series Earth Leakage Circuit Breaker



Application and Description

TOS1L series earth leakage circuit breaker are one of the new type earth leakage breakers which have been developed by the company using international advanced design and manufacturing technology. Suitable for a line of AC50/60Hz, rated voltage up to 400V, rated current 16A to 630A. and is acted as infrequent changeover of circuit or infrequent starting of motor. The breaker has overload, short-circuit and under-voltage protective function, which can protect the circuit and the power equipment against damage, meanwhile, it can provide protection to these fire dangers that caused by these long-time existed grounding fault that can not be detected by the over-current protection.

This breaker can be installed vertically(uptight) or horizontally(transverse).

Wiring of the breaker can not be in adverse direction, that means power supply line must be connected to terminal 1,3 and 5,and the load line connected to terminal 2,4 and 6.

The rated residual operating current $I_{\Delta n}$ and the maximum breaking time can be adjusted on site according to practical condition.

The leakage protection module still can work normally when the phase voltage reduce to 50V.

It has the same overall size with the TOS1 series breakers, which make the installation more exchangeable.

The breakers are suitable for isolation, its symbol are: 

The breakers comply with the demands of the following standards:

IEC60947-1 and GB/T 14048.1 General

IEC60947-2 and GB 14048.2 Low voltage breakers

IEC60947-4 and GB 14048.4 Contactors and motor starters

IEC60947-5.1 and GB 14048.5 Electrical equipments of electromechanical control circuit

Main Technical Specifications

Table 1

Type		TOS1L-125		TOS1L-250		TOS1L-400		TOS1L-630		
Frame current $I_{nm}(A)$		125		250		400		630		
Rated current $I_n(A)$		(10)16, 20, 25, 32, 40, 50, 63, 80, 100, 125		100, 125, 160, 180, 200, 225, 250		315, 350, 400		400, 500, 630		
Pole number		3	4	3	4	3	4	3	4	
Rated insulation voltage $U_i(V)$		AC800								
Rated working voltage $U_e(V)$		AC 400V								
Rated impulse with stand voltage $U_{imp}(V)$		8000								
Arc-over distance(mm)		≥50								
Breaking capacity grade		M		M		M		M		
Limiting short-circuit breaking capacity $I_{cu}(kA)$	AC400V	50	50	50	50	65		65		
Service short-circuit breaking capacity $I_{cs}(kA)$	AC400V	35	35	35	35	42		42		
Rated residual operating current $I_{\Delta n}(mA)$	Non-delay type	100/300/500								
	Delay type	100/300/500						300/500/1000		
Rated residual non-operating current $I_{\Delta no}(mA)$		1/2 $I_{\Delta n}$								
Operation performance (time)	Electrified	1500		1000		1000		1000		
	Unelectrified	8500		7000		4000		4000		

Note: According to the pole number of product, it classifies three and four poles. The neutral pole (N-Pole) of the four-poles products has four types:

Type A: N-pole without over-current release unit, it has been connected all the time, not closing and opening with the other three poles.

Type B: N-pole without over-current release unit, which closing and opening with the other three poles.

Type C: N-pole fixed with over-current release unit, which closing and opening with the other three poles.

Type D: N-pole fixed with over-current release unit, it has been connected all the time, not closing and opening with the other three poles.

1. The limiting breaking and arc-over distance includes horizontal and vertical installation.

2. If the three-pole breaker of this series is connected with three phase load, the load can not have neutral line, otherwise the breaker will have fault action.

3. If the three-pole breaker of this series is connected with single phase load, the phase line will be connected to the left pole, and the neutral line is connected to the right pole, the middle pole is blank

Protection Characteristic

The thermal release of the breaker has again-time-limit property; the electromagnetic release is inst. Operation, its property see table 2(for distribution),table 3 (motor protection).

Table 2

Rated current of release(A)	Thermal release (ambient temperature +40°C)		Electromagnetic release tripping current(A)
	1.05I _n (cold state) non-trip time (h)	1.03I _n (hot state) trip time (h)	
10 ≤ I _n ≤ 63	1	1	10I _n ± 20%
63 ≤ I _n ≤ 125	2	2	
125 ≤ I _n ≤ 630	2	2	5I _n ± 20% 10I _n ± 20%

Table 3

Rated current of release	Thermal release (ambient temperature +40°C)				Electromagnetic release tripping current(A)
	1.0I _n (cold state) non-trip time(h)	1.20I _n (hot state) trip time(h)	1.50I _n (thermal state) trip time	7.2I _n (cold state) trip time	
10 ≤ I _n ≤ 400	2	2	8min	6s < T _p ≤ 20s	12I _n ± 20%

Residual Current Operating Time of Earth Leakage Circuit Breaker

Non-delay type operation characteristics see table 4(I Δ n ≤ 30mA should be Non-delay type)

Table 4

Rated current		I Δ n	2I Δ n	5I Δ n ^a	10I Δ n
Non-delay type	Max.breaking time(s)	0.3	0.15	0.04	0.04

Note: ^ato I Δ n ≤ 30mA earth leakage circuit breaker, 0.25A can instead of 5I Δ n

According to^a, adopt 0.25A, then 10 I Δ n is 0.5A.

Delay type operation characteristics see table 5

Limiting non-driven time of delay type earth leakage circuit breaker according to 2I Δ n, operation characteristics see table 5

Table 5



Back panel connection

Delay time(s)	Max. breaking time(s) at I Δ n	Limiting non-driven time(s) at 2I Δ n	Max. breaking time(s)	Max. breaking time(s) at 5I Δ n	Max. breaking time(s) at 10I Δ n
0.1	0.4	0.06	0.2	0.15	0.15
0.2	0.5	0.06	0.2	0.15	0.15
0.3	0.6	0.1	0.4	0.3	-
0.4	0.7	0.2	0.5	0.4	-
0.5	0.8	0.3	0.6	0.5	-
0.6	0.9	0.4	0.7	0.6	-
0.7	1.0	0.5	0.8	0.7	-

Accessories of Circuit Breaker

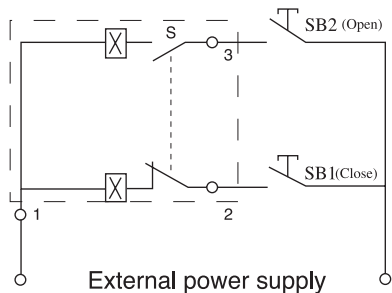
The external accessories of the breaker

Motor-driven operation device

1) Wiring diagram of type CDM electromagnetic operation device(fitting TOS1L-125,250) see the following drawing (wiring diagram of the external accessories of the breaker in the dotted frame)



Electromagnetic operation device



2) Wiring diagram of type CD motor-driven operation device (fitting TOS1L-400, 630) see belows (wiring diagram of the external accessories of the breaker in the dotted frame)

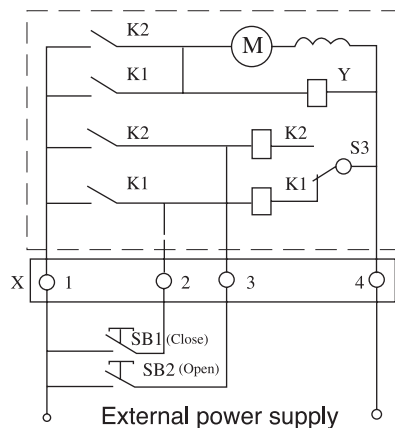
Code description: SB₁, SB₂ stand for push button.(provided by users themselves)

Number "1", "2", "3" stand for number of wiring terminals.

Voltage rating: AC50Hz 230V, 400V, DC 220V



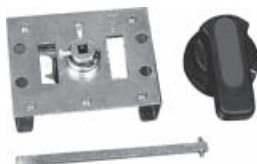
Motor-driven operation device



Code description: SB₁, SB₂ stand for push button. (provided by users themselves)

"X" stands for line connection terminals

Voltage rating: AC50Hz 230V, 400V; DC220V



Rotary handle operation device

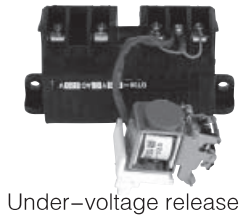
Rotary handle operation device

The mechanism is used in moulded case circuit breaker to operate the draw-out panel. Power distribution panel and supply box outside the panel by turning the handle ,and to ensure the door of panel would not be opened when the breaker being on.

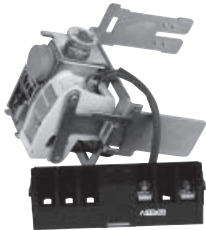
The hand-drive mechanism can be equipped with two types of operation one is "A" model square handle , the other is "B" model round handle.

The Internal Accessories of the Breaker

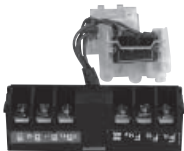
Release pattern and accessories code see following table



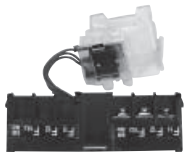
Under-voltage release



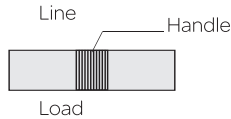
Shunt release



Alarm contact



Auxiliary contact



SHT: Shunt release; UVR: Under-voltage release;
AX: Auxiliary contact; AL: Alarm contact

Release pattern and accessories code	Type		TOS1L- 125, 250	TOS1L-400	TOS1L-630
	Name				
200, 300	Without accessories		200: Magnetic release (only short circuit protection) 300: Thermal magnetic release(both overload and short circuit protection)		
208, 308	Alarm contact				
210, 310	Shunt release				
220, 320	Auxiliary contact				
230, 330	Under-voltage release				
228, 328	Auxiliary contact, Alarm contact				

The technical parameter and functions of the accessories

Accessory	Rated operating voltage (V)			
	AC50/60Hz		DC	
Shunt release Us	220(230)	380(400)	110	220
Under-voltage release Us	220(230)	380(400)		

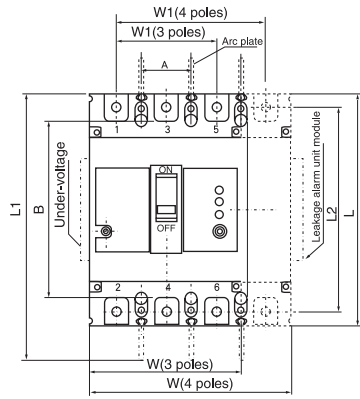
Auxiliary contact and Alarm contact: Auxiliary contact is as some as Alarm contact , the technical parameter see following table

Rated thermal current Ith (A)	Rated operating current Ie(A)		Suited Frame Inm(A)
	AC380V	DC220V	
3	0.3	0.15	100, 225
3	0.4	0.15	400, 630

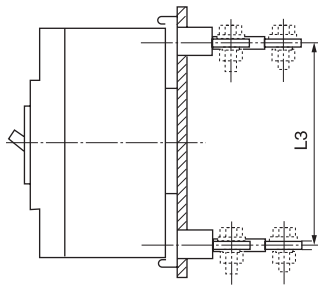
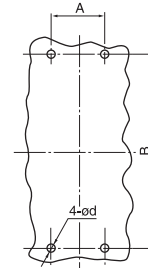
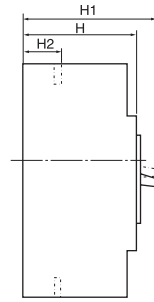
Accessories name	Function	Wiring connection diagram
Alarm contact	Indicate circuit breaker at tripping	<p>The position of breaker at opening and closing</p>
Auxiliary contact	Indicate circuit breaker at opening or closing	<p>The position of breaker at opening</p>
Shunt release	The shunt release should make the breaker trip reliably when the operation voltage is 70%-110% of rated control voltage	<p>The micro switch will cut by itself when breaker open</p>
Under-voltage release	When Ue is 35%-70% of the rated control voltage, the under voltage release should make the breaker trip correctly When Ue is 85%-110% of the rated control voltage, the under voltage release should make the breaker close In case of Ue less than 35%of the rated control voltage should prevent the breaker from closing	

Outline and Installation Dimensions

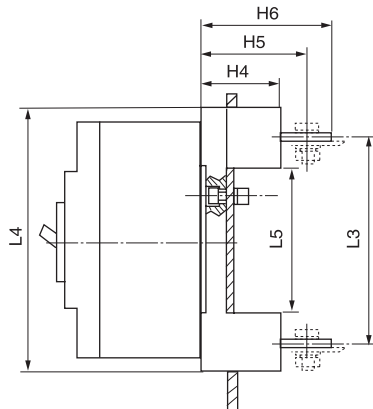
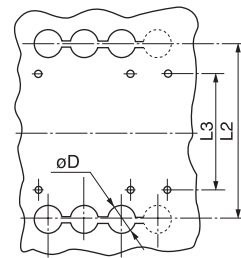
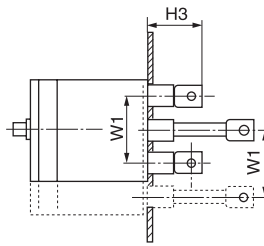
Type	Outline dimensions																			Installation dimensions		
	Front panel connection								Back panel connection			Plug-in connection										
	W	L	H	W1	L1	L2	H1	H2	L3	H3	D	L4	L5	H4	H5	H6	C	D	D1	A	B	d
TOS1L-125/3P	92	150	92	60	200	200	132	110	28.5	90	93	168	92	50	64	76	60	56	6.5	30	129	4.5
TOS1L-125/4P	122	150	92	90	200	200	132	104	28.5	90	93	168	92	50	64	76	60	56	6.5	30	129	4.5
TOS1L-250/3P	107	165	90	70	265	265	144	110	24	93	100	183	94	50	71.5	86.5	90	54	6.5	35	126	5.5
TOS1L-250/4P	142	165	103	105	265	265	144	127	24	93	100	183	94	50	710.5	86.5	70	54	6.5	35	126	5.5
TOS1L-400/3P	150	257	106.5	96	441	441	224	146.5	38	164	108.5	279	-	60	83.5	106.5	105	129	8.5	44	194	7
TOS1L-400/4P	198	257	106.5	144	441	441	224	146.5	38	164	108.5	279	-	60	83.5	106.5	70	129	8.5	44	194	7
TOS1L-630/3P	210	280	115.5	145	480	480	243	155	45.3	158	84	296	-	61	97	148	140	143	10	70	243	7
TOS1L-630/4P	280	280	115.5	210	480	480	243	155	45.5	158	84	296	-	61	97	148	210	143	10	70	243	7



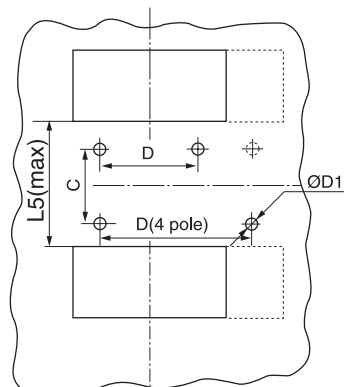
Front panel connection



Back panel connection



Plug-in connection

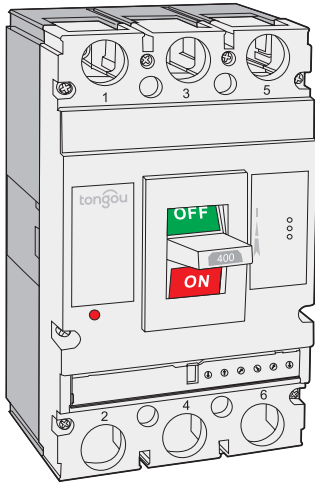


Circuit protection

Switch-disconnector



TOS1E-250 Series Moulded Case Circuit Breaker



Application and Description

TOS1E series intelligent moulded case circuit breaker is developed and manufactured by adopting international advanced technology. It is supplied with rated insulating voltage 800V and used for circuit of AC 50/60Hz, rated operating voltage 400V, rated operating current up to 800A of the circuit breaker infrequent changing over and starting of the motors. The circuit breaker has protection function of overload long delay inverse time, short circuit short delay time limit, short circuit instantaneous and under voltage, which can protect the line and power supply equipment from damage. The circuit breaker can be mounted vertically (i.e. vertical) or horizontally. The Circuit breaker cannot be poured into the line, that is, only 1, 3, 5 connect power cord; 2, 4, 6 connect load line.

The breakers comply with the demands of the following standards:

IEC60947-1 and GB/T 14048.1 Low-voltage switchgear and control equipment Part 1: General

IEC60947-2 and GB 14048.2 Low-voltage switchgear and control equipment, the second part of circuit breaker and annex with electronic over-current protection circuit breaker additional requirement;

IEC60947-4 and GB 14048.4 Low-voltage switchgear and control equipment contactors and motor starts;

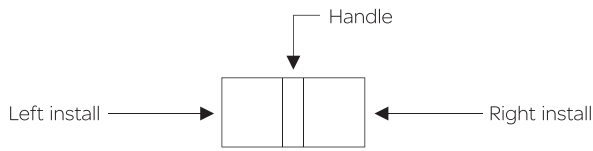
IEC60947-5.1 and GB 14048.5 Low-voltage switchgear and control equipment electromechanical control circuit electrical appliances.

GB22710 electronic controller for low voltage circuit breaker.

Main Technical Specifications

Type	TOS1E-125	TOS1E-250	TOS1E-400	TOS1E-800
Frame current I_m (A)	125	250	400	800
Rated current I_n (A)	32A(16,20,25,32)	100,125,140,160,180,200,225,250	200,225,250,280,315,350,400	630,640,660,680,700,720,740,760,780,800
	125A(40,50,60,70,80,90,100,125)			
Pole number	3,4	3,4	3,4	3,4
Rated insulation voltage U_i (V)	AC690V			
Rated working voltage U_e (V)	AC 400V			
Rated impulse withstand voltage U_{imp} (V)	6000V	8000V	8000V	8000V
Rated frequency	50Hz			
Flashover distance	Top-down	≥50	≥50	≥80
	Left-right	0	0	0
	Front-back	0	0	0
Using category	A	B	B	B
Rated limiting short-circuit breaking capacity	50	50	85	85
Rated service short-circuit breaking capacity	65	35	65	65
Rated withstand short-circuit current	1.5	5	8	10
Operating life(time)	Electrical	1500	1000	1000
	Mechanical	8500	7000	4000

Main Technical Performance of Circuit Breaker

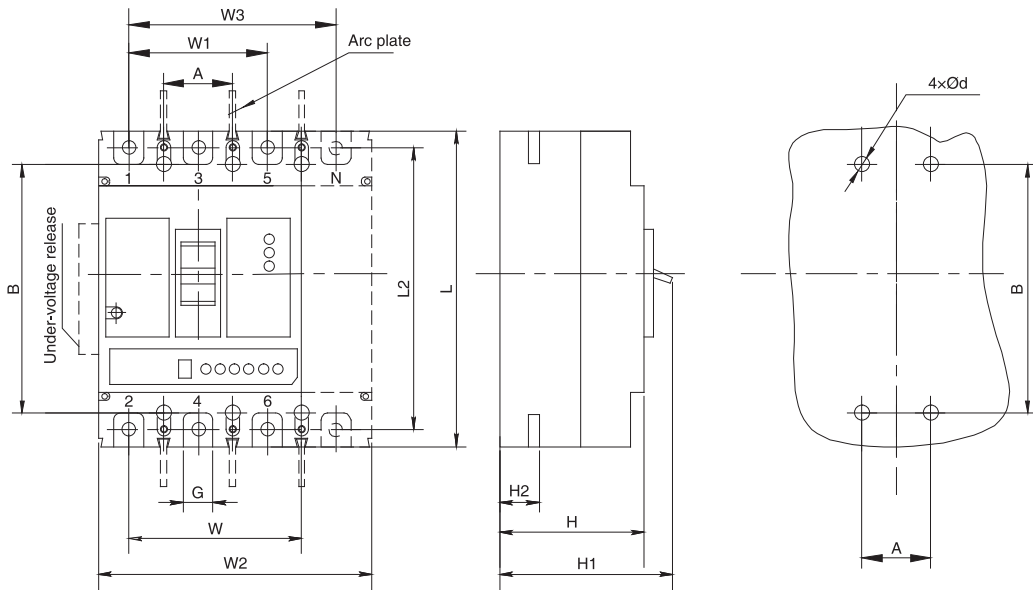


- ▲ Under-voltage release
- Shunt release
- Alarm contact
- Two group of auxiliary contact
- Leading wire

Type		TOS1E-125		TOS1E-250		TOS1E-400		TOS1E-800	
Accessories code	Name	Pole		Pole		Pole		Pole	
		3	4	3	4	3	4	3	4
308	Alarm contact	← ●	← ●	← ●	← ●	← ●	← ●	← ●	← ●
310	Shunt release	← ■	← ■	← ■	← ■	← ■	← ■	← ■	← ■
320	Auxiliary contact	← ○	← ○	← ○	← ○	← ○	← ○	← ○	← ○
330	Under-voltage release	← ▲	← ▲	← ▲	← ▲	← ▲	← ▲	← ▲	← ▲
340	Shunt release Auxiliary contact		← ■ ○		← ■ ○		← ■ ○		← ■ ○
350	Shunt release Under-voltage release	—	—	—	—	—	—	← ■ ▲	← ■ ▲
360	Two group of auxiliary contact	← ○ ○	← ○ ○	← ○ ○	← ○ ○	← ○ ○	← ○ ○	← ○ ○	← ○ ○
370	Auxiliary contact Under-voltage release	← ▲ ○	← ▲ ○	← ▲ ○	← ▲ ○	← ▲ ○	← ▲ ○	← ▲ ○	← ▲ ○
318	Shunt release Alarm contact	—	—	—	—	—	—	← ● ■	← ● ■
328	Auxiliary contact Alarm contact	← ● ○	← ● ○	← ● ○	← ● ○	← ● ○	← ● ○	← ● ○	← ● ○
338	Under-voltage release Alarm contact	—	—	—	—	—	—	← ▲ ●	← ▲ ●
348	Shunt release Auxiliary contact Alarm contact	—	—	—	—	—	—	← ○ ■ ●	← ○ ■ ●
368	Two group of auxiliary contact Alarm contact	← ○ ○	← ○ ○	← ○ ○	← ○ ○	← ○ ○	← ○ ○	← ○ ○	← ○ ○
378	Alarm contact Under-voltage release Alarm contact	—	—	—	—	—	—	← ▲ ● ○	← ▲ ● ○

Note
 a. Release and internal accessories code first number 3 with three section protection electronic release. After the two digit indicate the internal attachment code. No internal accessory attachments with 00.
 b. 348 specifications of TOS1E-800 auxiliary contact for a pair of contacts (i.e., 1 NO and 1 NC). 368 specifications auxiliary contact three pairs of contacts (3 NO and 3 NC).

Main Technical Specifications



Covering all your applications

TOW45 meets the needs of all types of LV electrical distribution networks.



Building

- > Hotels
- > Hospitals
- > Offices
- > Retail



Data Centres and Networks



Industry

- > Mining and minerals
- > Automotive
- > Food and beverage
- > Chemical industry



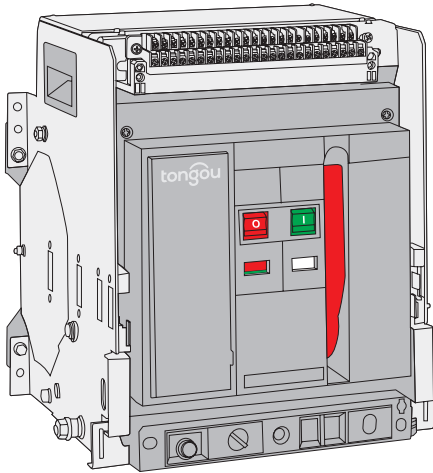
Energy and Infrastructures

- > Airports
- > Oil and gas
- > Water
- > Electrical energy
- > Marine



An answer to specific applications

- > 1000 V for mining applications
- > Direct current networks
- > Corrosion protection
- > Switch-disconnectors and earthing switches
- > Automatic transfer switching equipment (ATSE) for emergency power systems.



Application

TOW45 series intelligent circuit breaker (hereinafter referred to as breaker) is suitable for the circuit of AC 50/60Hz with rated voltage 400V, 690V and rated current up to 6300A. It is mainly used to distribute electric energy and protect circuit and power supply equipment from overload, under-voltage, short-circuit, and single-phase earthing. With intelligent and selective protection functions, the breaker can improve the reliability of power supply, and avoid unnecessary power failure. The breaker is applicable for power stations, factories, mines (for 690V) and modern high-building, especially for the distribution system of intelligent building.

The breaker conforms to IEC60947-2. The whole series have passed CCC certification and CE certification.

Environment Conditions for Operation

Temperature condition: -5°C - $+40^{\circ}\text{C}$; the average value within 24h not exceed $+35^{\circ}\text{C}$.
Elevation: altitude of installation place shall not exceed 2000m.

Atmosphere condition: relative humidity at $+40^{\circ}\text{C}$ shall not exceed 50%. Higher humidity is permissible at lower temperature condition. When the higher monthly average relative humidity is 90% in the humidest month, the lowest monthly average temperature of this month is $+25^{\circ}\text{C}$. And consider the influence of dew on product surface due to temperature changes.

Pollution grade: grade III.

The breaker should be installed according to the requirement on the instruction manual: the vertical inclination degree shall not exceed 5° .

Specification

Type		TOW45-2000	TOW45-3200	TOW45-4000	TOW45-6300
Frame rated current I_{nm} (A)		2000	3200	4000	6300
Number of poles		3,4	3,4	3,4	3,4
Rated current I_n (A)		630, 800, 1000, 1250, 1600, 2000	2000, 2500, 3200	2000, 2500, 3200, 4000	4000, 5000, 6300
Icu (kA)	400V	80	100	100	120
	690V	50	65	65	80
Ics = Icw (kA)	400V	50	80	80	100
	690V	40	50	50	65
Rated current at N-pole I_n (A)		50% I_n , 100% I_n			
Inherent making & breaking time		23-32ms			
Operational performance (operations)	Electric life	500			
	Mechanical life	Maintenance-free 2500 Maintenance 10000			
Mounting mode		Fixed withdrawable			
Arcing distance (mm)		0			
Intelligent controller		Standard type (M) telecommunication type (H)			

Intelligent Controller

Intelligent controller is one of the core components of the circuit breaker

Properties of the intelligent controller

- a. Protective function of over-load long time-delay and inverse time limit, short time-delay and inverse time limit, short time-delay definite time limit instantaneous operation protection;
- b. Single-phase earthing failure protection;
- c. Display of setting current I_r and operational current;
- d. Ampere meter;
- e. Over-load alarm;
- f. Short-circuit alarm
- g. Testing of operational properties

Note: The breakers with telecommunication port are available to realize remote control to breaker through master computer.

Protection performances of over-current release

- a. I_r and its inaccuracy of the controller

$I_{nm}(A)$	Long time-delay		Short time-delay		Instantaneous		Earthing failure	
	I_{r1}	Error	I_{r2}	Error	I_{r3}	Error	I_{r4}	Error
≥ 2000	$(0.4 \sim 1)I_n$	110%	$(0.4 \sim 15)I_n$	110%	$1.0I_n \sim 15kA$	115%	$I_{nm} \leq 4000A(0.2-0.8) I_n(\text{Max.}1200A, \text{Min.}200A)$ $I_{nm} \leq 6300A(0.2-1.0) I_n$	$\pm 10\%$

Note: 1. When the breaker could realize over-load with long time delay ,short-circuit with short time-delay and short-circuit instantaneous protections, the setting ratings can not be over-lapped ,and $I_{r1} < I_{r2} < I_{r3}$

2. When the frame is 3200A and above ,the setting ratings range from $1.01I_n$ to 75kA.

- b. Characteristics of long time-delay protection

1.05 I_{r1}	1.3 I_{r1}	1.5 I_r	2.0 I_{r1}
>2h non-tripping	<1h tripping	15s, 30s, 60s, 120s, 240s, 480s	8.4s,16.9s,33.7s,67.5s,135s,270s

- c. Characteristics of short time-delay protection.

For low over-current ,inverse time-limit protection could be realized; when the over-current is $>8 I_{r1}$, it will automatically change to be definite time-limit protection properties.

Refer to table below for time-limit properties.

Setting delay time (s)	Returnable time (s)
0.1, 0.2, 0.3, 0.4	0.06, 0.14, 0.23, 0.35

Standard Composition

To facilitate your ordering and utilization, the TOW45 intelligent with basic electric accessories as follows.

Standard composition of the breaker	Fixed type	Withdrawable type
Body	<input type="checkbox"/>	<input type="checkbox"/>
Drawer base	<input type="checkbox"/>	<input type="checkbox"/>
Intelligent controller	<input type="checkbox"/>	<input type="checkbox"/>
Electric motor	<input type="checkbox"/>	<input type="checkbox"/>
Closing electro-magnet	<input type="checkbox"/>	<input type="checkbox"/>
Shunt release	<input type="checkbox"/>	<input type="checkbox"/>
Under-voltage	<input type="checkbox"/>	<input type="checkbox"/>
Auxiliary contact	<input type="checkbox"/>	<input type="checkbox"/>
Door frame	<input type="checkbox"/>	<input type="checkbox"/>

Accessories

Shunt release

- a. Shunt release is for remote breaking of circuit breaker so as to enhance security of the operator;
- b. Ratings of shunt release

Rated operational voltage (V)	AC220V	AC380V	DC110V	DC220V
Operational voltage range	(70% - 110%) U_e			
Power consumption	24VA	24VA		40W

Under-voltage release

- a. It is an optional accessory;
- b. Mainly used to protection apparatus from damage due to lowering of the operational voltage to a certain value;
- c. Two types of release are available: instantaneous release and time-delay release;
- d. For breakers appended with the release, it should be electrified continuously;
- e. Ratings of under-voltage release.
- f. Operation properties of under-voltage release

Rated operational voltage (V)	AC220V	AC380V	DC110V	DC220V
Operational voltage range	(35%-110%) Us			
Power consumption	24VA	24VA		40W

Category		Under-voltage time-delay release	Under-voltage instantaneous release
Operation time of the release		Time-delay: 1s,3s,5s	Instantaneous
Operational voltage of the release	35% Us ~ 70% Us	Break the breaker	Break the breaker
	≤ 35% Us	Can not make the breaker	Can not make the breaker
	≥ 85% Us-110% Us	Reliably make the breaker	Reliably make the breaker
Within 1/2 delay time, voltage of power supply recovers to 85% Us		Can not trip the breaker	

Note: Error the time of time-delay is 110%

Closing electro-magnet

- a. The magnet is for remote making of circuit breaker so as to enhance security of the operator.
- b. The magnet could not be electrified for a long time.
- c. Ratings of the magnet.

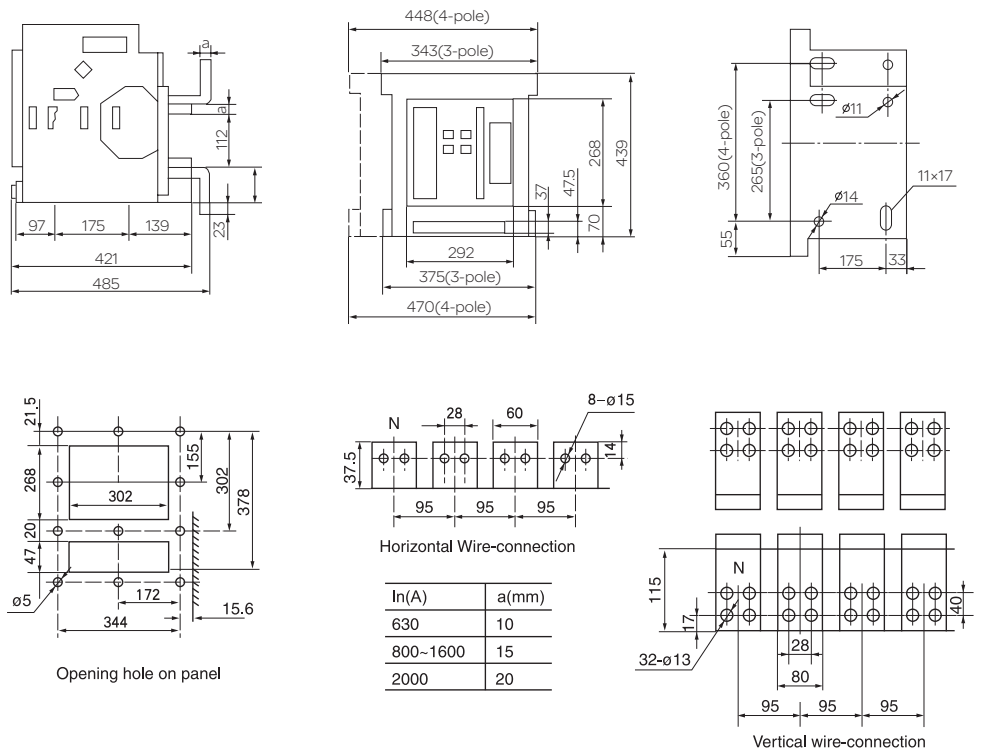
Rated operational voltage (V)	AC220V	AC380V	DC110V	DC220V
Operational voltage range	(85%-110%) Us			
Power consumption	40VA	40VA		40W

Auxiliary contact

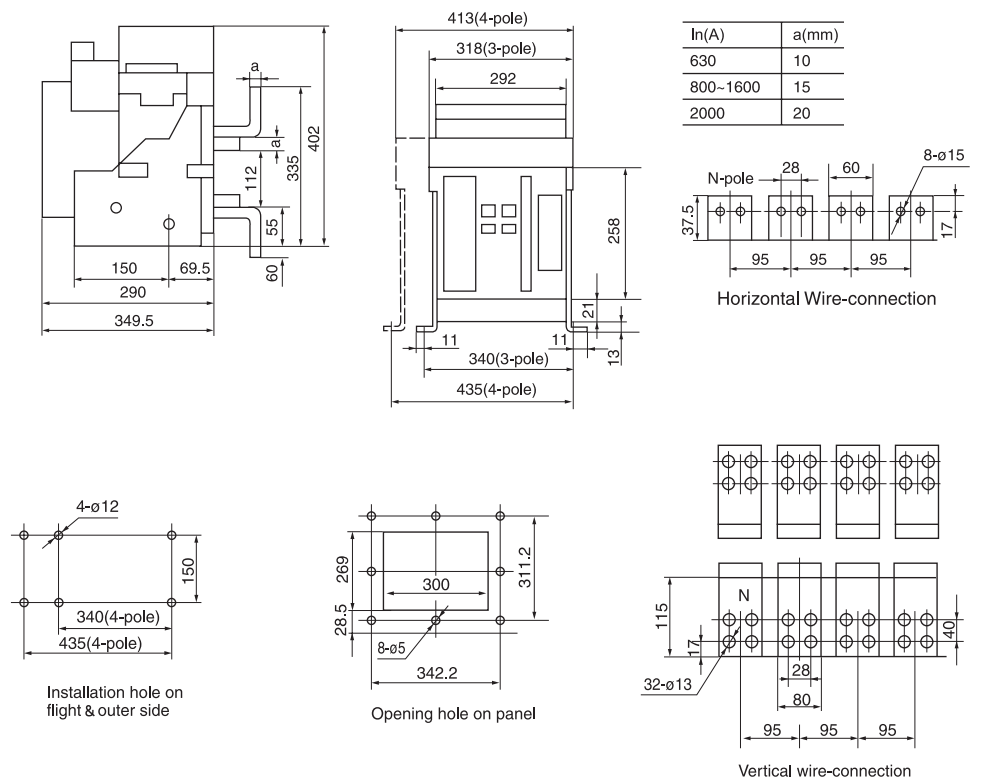
- a. Conventional heating current of auxiliary contact: 6A
- b. Auxiliary contacts: 4NO+4NC, 3NO+NC, 5NO+5NC(customization)

Outline and Installation Dimensions

TOW45-2000 Drawer-type

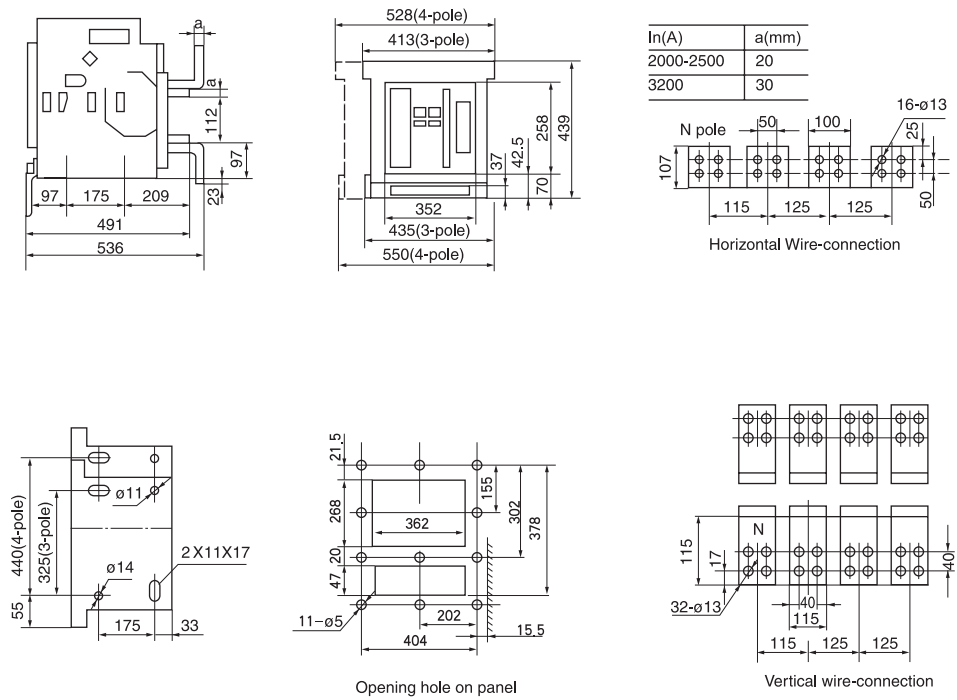


TOW45-2000 Fixed type

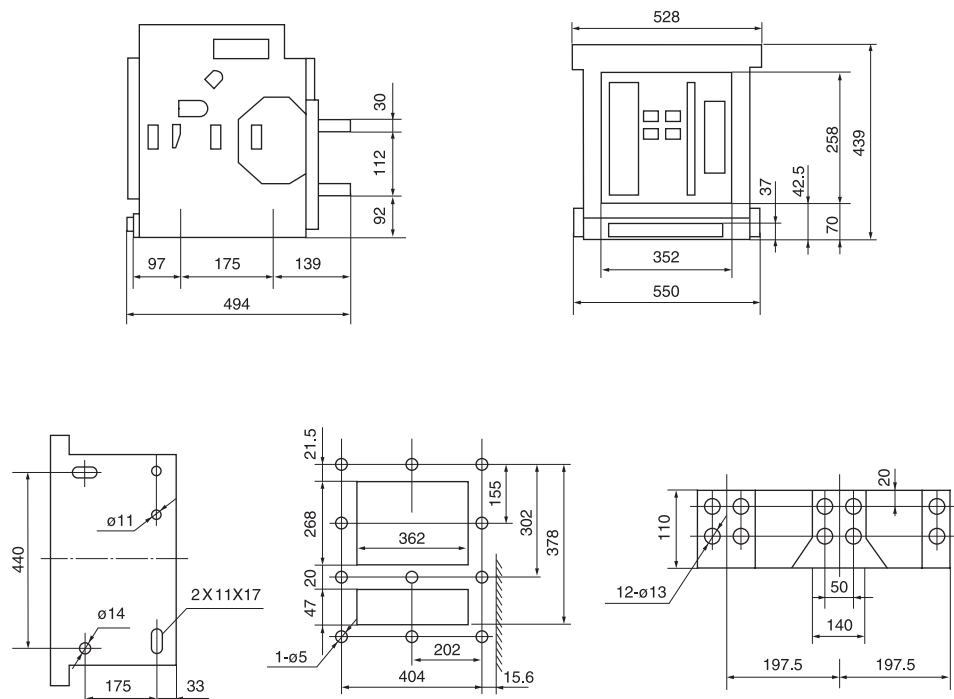


Outline and Installation Dimensions

TOW45-3200 Drawer-type

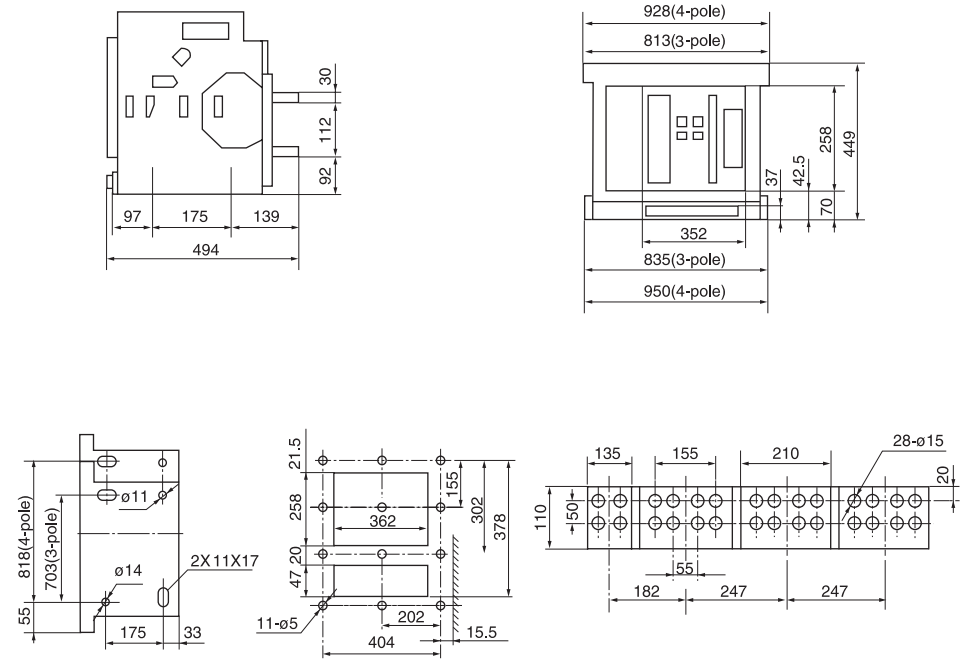


TOW45-4000 Drawer type(3-Pole)

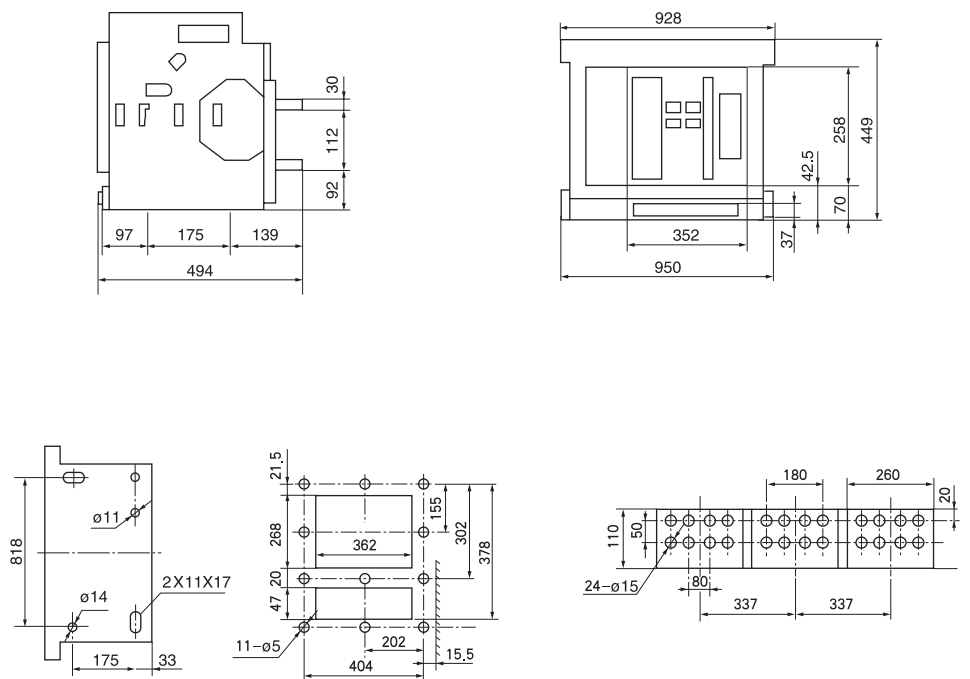


Outline and Installation Dimensions

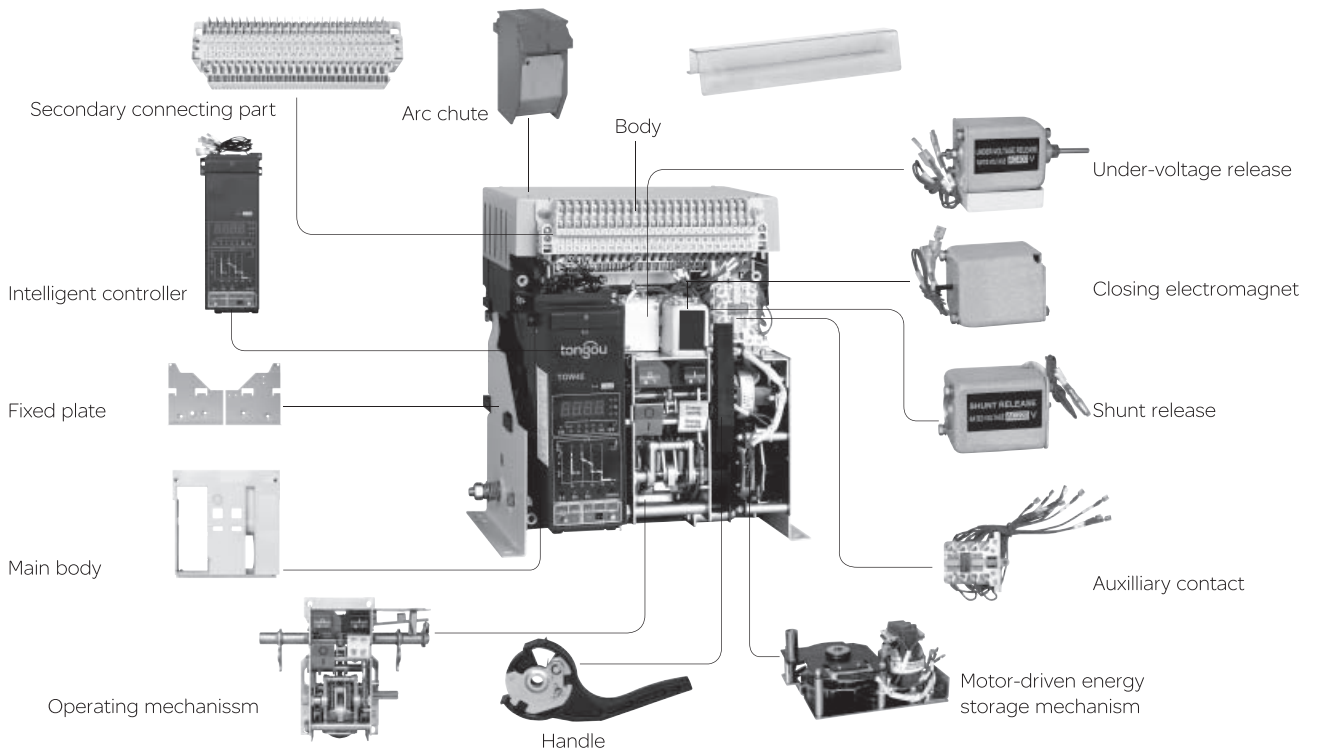
TOW45-4000, 5000 Drawer type



TOW45-6300 Drawer type(3-Pole)



Fixed Type Structure Explosion



Drawer Type Structure Explosion

